

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Application No. 10/797,579
Attorney Docket No. Q80074

REMARKS

Reconsideration and allowance of this application are respectfully requested. Claims 1, 2, 7 and 11 have been amended. Claims 4 5 have been canceled. Claims 3 and 8 were previously withdrawn, and have now also been canceled. Claims 1, 2, 6, 7 and 9-13 are now pending in the application. The rejections are respectfully submitted to be obviated in view of the remarks presented herein.

Rejection Under 35 U.S.C. § 102(e) - Benson

Claims 7 and 13 have been rejected under 35 U.S.C. § 102(e) as allegedly being anticipated by Benson (U.S. Patent Application Publication No. 2004/0126923). The rejection is respectfully traversed.

In amended independent claim 7, a spin coating apparatus for coating photoresist that comprises “a spin chuck for rotating a wafer; a nozzle part for depositing photoresist onto the wafer mounted on the spin chuck; and a gas exhaust part disposed so that gas is exhausted from an edge of the wafer in a turning direction of the wafer and a centrifugal direction upon rotation of the wafer; wherein the spin chuck comprises a mount part and an extended projection part, the extended projection part surrounding a circumference of the wafer while being in contact with the circumference of the wafer mounted on the mount part.”

The disclosure of Benson does not anticipate the claimed invention. Benson does not teach or suggest an extended projection part surrounding a circumference of the wafer while

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Application No. 10/797,579
Attorney Docket No. Q80074

being in contact with the circumference of the wafer mounted on the mount part. Benson discloses in figures 1-3 only that a wafer (3) is mounted on a vacuum chuck (9) so that an outer edge of the wafer (5) overhangs the vacuum chuck (9). At least by virtue of the aforementioned differences, Applicants' claim 7 distinguishes over Benson. Claim 13 is a dependent claim including all of the elements of independent claim 7, which as established above, distinguishes over Benson. Therefore, claim 13 is patentable over Benson for at least the aforementioned reasons as well as for its additionally recited features. Reconsideration and withdrawal of the rejection under 35 U.S.C. § 102(e) are respectfully requested.

Rejection Under 35 U.S.C. § 103(a) - Scheu et al. in view of Sago et al.

Claims 1, 2, 4, and 9-10 have been rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Scheu et al. (U.S. Patent No. 4,024,835; hereinafter "Scheu") in view of Sago et al. (U.S. Patent No. 6,436,472; "Sago"). The rejection is respectfully traversed.

Regarding amended independent claim 1, a spin coating apparatus for coating photoresist comprises a spin chuck, which comprises "a mount part, for mounting a wafer thereon, and an extended projection part for facilitating formation of an edge-bead thereon." The spin coating apparatus also comprises "a nozzle for depositing photoresist onto a wafer mounted on the mount part of the spin chuck; wherein the extended projection part surrounds a circumference of the wafer while being in contact with the circumference of the wafer mounted on the mount part."

In rejecting claim 1, the Examiner alleges that Scheu in view of Sago discloses each element of the claimed invention. However, there is no teaching or suggestion in either Scheu or

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Application No. 10/797,579
Attorney Docket No. Q80074

Sago of an extended projection part of the spin chuck surrounding a circumference of the wafer while being in contact with the circumference of the wafer mounted on the mount part, as recited by amended claim 1. Although Scheu shows in figure 3B a spinner chuck (310) with a recessed area (305) for received a substrate (115), Scheu explicitly discloses a gap between the spinner chuck (310) and the substrate (115) (column 2, lines 12-24). Therefore, the extended projection part of the spinner chuck (310) in Scheu is **not in contact with the circumference of the wafer**. Sago also fails to disclose or suggest the deficiencies of Scheu.

The Examiner has relied upon another reference Kostler et al. (US 2003/0002973) which was not cited or based upon for any rejection in the Office Action. Paragraph [0019] of Kostler et al., as referred to by the Examiner, discloses only that focus spots may be present on a wafer, which are localized regions of defocusing which contains an upper wafer surface which is located out of the depth of focus and prevents accurate production of semiconductor products in these spots (paragraph [0017]). Any kinds of irregular thickness pertaining to the wafer of Kostler et al., as suggested by the Examiner, would not teach or suggest that **the wafer will actually contact the extended projection part** in a spinner chuck (310) of Scheu, as the gap is absolutely necessary for the operation of Scheu to alleviate uneven build-up of photoresist. Furthermore, Kostler et al. only teaches the focus spots as irregularities, and such wafers including these focus spots may be used in the system of Scheu, still resulting in a gap as shown in Scheu's figure 3B. Therefore, Kostler et al. still would not remedy the deficiency of Scheu in view of Sago.

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Application No. 10/797,579
Attorney Docket No. Q80074

At least by virtue of the aforementioned differences, Applicants' claim 1 distinguishes over Scheu in view of Sago. Claims 9 and 10 are dependent claims including all of the elements of independent claim 1, which as established above, distinguishes over Scheu in view of Sago. Therefore, claims 9 and 10 are patentable over Scheu in view of Sago for at least the aforementioned reasons as well as for their additionally recited features. Reconsideration and withdrawal of the rejection under 35 U.S.C. § 103(a) are respectfully requested.

Regarding amended claim 2, the extended projection part of the spin chuck has a height lower than that of the wafer mounted on the mount part. There is no teaching or suggestion in either Scheu or Sago of the claimed elements as recited by claim 2. The Examiner has cited to Kostler et al. as an example of a wafer handling system which processes wafers of particular irregularities such as scratches and higher adjacent elevating walls. Although Kostler et al. discloses such irregularities, even if such a wafer were to be used in the system of Scheu in view of Sago, there is still no teaching or suggestion of the extended projection part of Scheu having a height lower than that of the wafer mounted on the mount part, as claimed. Kostler et al. solely teaches the handling of wafers with particular irregularities, and there is no teaching or suggestion of particularly providing an extended projection part of a spinner chuck (310 in Scheu's figure 3B) having a height lower than that of the mounted wafer (Scheu's substrate (115)). Irregularities of the wafer in and of themselves do not suggest that such a wafer will be mounted and disposed in a particular relative height in the system of Scheu. At least by virtue of the aforementioned differences, Applicants' claim 2 distinguishes over Scheu in view of Sago.

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Application No. 10/797,579
Attorney Docket No. Q80074

Reconsideration and withdrawal of the rejection under 35 U.S.C. § 103(a) are respectfully requested.

Rejection Under 35 U.S.C. § 103(a) - Scheu et al. in view of Sago et al. and further in view of Ikeda and Akaike et al.

Claims 5 and 11 have been rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Scheu in view of Sago and further in view of Ikeda (U.S. Patent No. 5,342,738). The rejection is respectfully traversed.

Regarding amended claim 11, “the spin chuck further comprises a separation part for separating the wafer from the spin chuck; and ... the separation part comprises removable plugs that are inserted through corresponding holes in the spin chuck to push against the bottom of the wafer and separate the wafer from the spin chuck.” In rejecting claim 11, the Examiner maintains that Ikeda discloses in figures 5a-5c a separation part of removable plugs (pins 51a and 51b) pushing against the bottom of the wafer to separate the wafer from the wafer chuck (2), and that Akaike discloses in figure 5A plugs (pins 15B) inserted through holes (56) to separate the wafer from the wafer chuck (50). However, none of the cited references teach or suggest **removable plugs inserted through corresponding holes in the spin chuck**, as recited by claim 11.

Ikeda’s lifting pins (51a and 51b) are raised to separate the wafer (1), however, these pins (51a and 51b) are not removable plugs inserted through corresponding holes in the spin chuck,

AMENDMENT UNDER 37 C.F.R. § 1.111

U.S. Application No. 10/797,579

Attorney Docket No. Q80074

as claimed. The lifting pins (51a and 51b) of Ikeda are merely raisable pins, and are not taught or suggested to be removable plugs.

Akaike's pins (15B) of figure 5A are movable vertically through three through-holes (56) formed in the groove (53B) of the wafer chuck (50), whereby the diameter of each through-hole (56) is **larger than that of each pin 15B**. Therefore, there is also no teaching or suggestion in Akaike of removable plugs, as claimed.

Therefore, Scheu in view of Sago and further in view of Ikeda and Akaike does not teach or suggest every element as recited by claim 11. At least by virtue of the aforementioned reasons, Applicants' claimed invention distinguishes over Scheu in view of Sago and further in view of Ikeda and Akaike. Reconsideration and withdrawal of the rejection under 35 U.S.C. § 103(a) are respectfully requested.

Rejection Under 35 U.S.C. § 103(a) - Scheu et al. in view of Sago et al. and further in view of Berman et al. or Benson

Claims 6 and 12 have been rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Scheu in view of Sago and further in view of Berman et al. (U.S. Patent Number 6,837,967; "Berman"). The rejection is respectfully traversed.

As discussed above, independent claim 1 recites a spin coating apparatus for coating photoresist, comprising a spin chuck, which comprises "a mount part, for mounting a wafer thereon, and an extended projection part for facilitating formation of an edge-bead thereon." The

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Application No. 10/797,579
Attorney Docket No. Q80074

spin coating apparatus also comprises “a nozzle for depositing photoresist onto a wafer mounted on the mount part of the spin chuck; wherein the extended projection part of the spin chuck surrounds a circumference of the wafer while being in contact with the circumference of the wafer mounted on the mount part.”

As also discussed above, Scheu in view of Sago and Benson fail to teach or suggest the claimed invention. Berman does not remedy the deficiencies of Scheu, Sago and Benson. Berman only discloses the cleaning of deposited films from the edge of a wafer using apertures (108) through which plasma gases are directed. However, there is also no teaching or suggestion in Berman of an extended projection part of the spin chuck surrounding a circumference of the wafer **while being in contact** with the circumference of the wafer mounted on the mount part. The Examiner has relied upon Berman solely for the teaching of a gas manifold (102) directed to the edge portions of the wafer.


At least by virtue of the aforementioned differences, Applicants’ claim 1 distinguishes over Scheu in view of Sago and further in view of Berman or Benson. Claims 6 and 12 are dependent claims including all of the elements of independent claim 1, which as established above, distinguishes over Scheu in view of Sago and further in view of Berman or Benson. Therefore, claims 6 and 12 are patentable over Scheu in view of Sago and further in view of Berman or Benson for at least the aforementioned reasons as well as for their additionally recited features. Reconsideration and withdrawal of the rejection under 35 U.S.C. § 103(a) are respectfully requested.

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Application No. 10/797,579
Attorney Docket No. Q80074

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

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